

PROJECT TITLE : FIAT  
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The objective of Project FIAT is to determine the retention of selected components of cigarette smoke by filters, filter additives and adsorbents and to investigate new and old filter additives by using new methods. The objective is to obtain maximum information on adsorbents which could be directly used by the Product Development Department.

The only data we have at present concern the porosity, the specific surface and the granulometry of adsorbents. In the near future the following data will be measured :

- retention of the main components of the organic gas-phase
- retention of NO and CO
- retention of HCN, nitrosamines

A selection of existing adsorbents based on their physical data, will be studied at the same time as new products.

#### NEW DEVICE FOR GAS-PHASE ANALYSIS

The method for quantitative analysis of the gas-phase of cigarette smoke was explained in a previous Report (1). This method uses the technique of the split mode (GC)<sup>2</sup>. Only a small part of the sample is injected in the column and in this particular case the gas chromatograph works at its limit of sensitivity. This is particularly constraining when a very diluted gas phase is analysed. To avoid this problem, a new device has been designed which allows the complete injection of the sample (splitless mode) without modification of the resolution.

This new system is based on the condensation of the sample in a small quartz tube plunged into liquid nitrogen. Cooling traps have already been used in the past, but always led to modification of the gas phase. By combining the small diameter of the tube (0.2 mm) with the inertness of quartz, it is possible to trap 0.5 to 2 ml of gas phase without changing

its composition. The liberation of the trapped compounds is performed by heating the flask of the tube, followed by direct on-column injection.

The attenuation is multiplied by a factor of 10 and the reproducibility is equal to that obtained with the previous method.

#### EFFICIENCY OF THE ADSORBENT

The first application of the system described is the comparison between the organic gas phase of 2 cigarettes, one with a filter containing charcoal and one with a filter containing pumice stone.

- cigarette : MAE without dilution by the filter
- adsorbents: charcoal : 80 mg coconut (Sutcliffe)  
pumice stone : 80 mg

The cigarettes had the same RTD and were smoked according to the Coresta norms.

The following table gives the percentage of retention for the charcoal; the pumice stone has a value of 0%.

| Compounds           | % Retention |
|---------------------|-------------|
| Acetaldehyde        | 61          |
| Propionaldehyde     | 66          |
| Acrolein            | 72          |
| Isopren             | 71          |
| Acetone             | 69          |
| Furane              | 72          |
| Methyl ethyl ketone | 69          |
| Benzene             | 58          |
| Acetonitrile        | 60          |
| Toluene             | 52          |

This short study proves that the method is applicable.

CONTINUATION OF WORK

Development of a general method to test all adsorbents under identical conditions.

Determination of the adsorbents which seem to be the most interesting as regards their physical properties.

REFERENCES

- (1) Genoud-Y. "Analysis of the Gas Phase of Cigarette Smoke by (GC)<sup>2</sup>" - Technical Report, February 1981.

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